FISHERY MANAGEMENT PLAN

St. Vincent Island National Wildlife Refuge

Apalachicola, Florida

Prepared By: _____ 12-17-86
OFA, Panama City, Florida — Date

Concurrences: _____ 12-17-86
Acting Project Leader, OFA
Panama City, Florida — Date

_____ 01/25/87
Refuge Manager — Date
St. Vincent Island National Wildlife Refuge
Apalachicola, Florida

_____ 2/9/87
Fishery Division Supervisor (FS-2) — Date
Fishery Resources, USFWS
Atlanta, Georgia

_____ 2/4/87
Refuge Division Supervisor (RF-4) — Date
Wildlife Resources, USFWS
Atlanta, Georgia

Approvals:

_____
Acting Assistant Regional Director - Fishery Resources — Date
U.S. Fish and Wildlife Service
Atlanta, Georgia

_____ 2/13/87
Assistant Regional Director - Wildlife Resources — Date
U.S. Fish and Wildlife Service
Atlanta, Georgia

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St. Vincent Island National Wildlife Refuge was established in 1968 primarily as a waterfowl refuge. Subsequent objectives addressed the protection of endangered species and their habitat and the development of a primitive area public use concept. The 12,358 acre barrier island refuge is located just off the Gulf Coast of Florida's Panhandle between the communities of Port St. Joe and Apalacicola (Appendix I). The island refuge boasts a variety of land types which include tidal marsh, saw palmetto, fresh water ponds and marshes, magnolia hammocks, pine flatwoods and scrub oak ridges.

Prior to becoming a National Wildlife Refuge, St. Vincent Island was used primarily as a private hunting and fishing preserve. Many forms of exotic animals (zebra, eland, sambur deer and black buck) were introduced on the Island. Today only sambur deer and numerous native wildlife species are found on the Island.

The aquatic habitat available for sportfishing consists of six fresh water lakes totaling 272 acres of water. Fishery management efforts will be directed towards enhancing and maintaining the sportfishery in these pools.

Native warmwater fish species provided by the Service's National Fish Hatchery System will be utilized in supplementing, managing and enhancing the sport fishery.

Introduction

The fishery management plan for St. Vincent Island National Wildlife Refuge was prepared by the Office of Fisheries Assistance, U.S. Fish and Wildlife Service, Panama City, Florida. Information and data were provided or obtained by the refuge staff, Panama City fishery biologists and previous fishery management program reports and management policies. The purpose of this plan is to outline goals and objectives in managing the fishery resource in relation to the Refuge's primary objective:

1) protection of endangered species of wildlife,
2) management of land and water resources to meet the needs of the total wildlife community and
3) provide the public opportunities for environmental education, interpretation and wildlife-oriented recreation.

Goals and Objectives

The wildlife-oriented objectives of the St. Vincent Island National Wildlife Refuge include the utilization of available funding and manpower to develop a sport fishery that will maintain and enhance the quality of the future angling opportunities.

Subgoal A

Manage, maintain, enhance and monitor the warm water fish populations in designated areas as directed by Refuge policies related to associated programs, objectives and available funding and manpower.

Fishery Habitat

The fishery habitat consists of 6 fresh water lakes, five of which are interconnected (Appendix II & III).

LAKE	ACREAGE
Oyster Pond	116
Lake 1 *	36
Lake 2 *	31
Lake 3 *	29
Lake 4 *	30
Lake 5 *	30
Total	272

* Interconnected Lakes

Early geological history indicates that St. Vincent Island had a number of brackish water marshes drained by tidal creeks. Prior to the 1900's the system might have been evolving into a freshwater system, however, to what degree if any - we do not know. In the 1940's prior owners constructed

water control structures on St. Vincent Creek, the outlet of Oyster Pond and built the road between Lakes 3 and 4. These changes in the habitat resulted in the development of the fresh water system that provides some of the finest warmwater sport fishing found in the Southeast.

The series of Lakes 1 through 5 (Lake 5 is the upper lake) can be divided into two water management regimes:

1) Lakes 1, 2 and 3 - water control structure located on on St. Vincent Creek
2) Lakes 4 and 5 - water control structure located between Lakes 3 and 4.

The capabilities are lacking to manage each lake individually, however, the present system provides adequate flexibility to implement some sound management decisions. Several factors must be addressed during water drawdown programs:

1) Lakes 1, 2 and 3 can be dewatered without effecting the water levels in Lakes 4 and 5
2) Lakes 4 & 5 can probably be dewatered by pumping into Lakes 1 through 3 (Lakes 4 and 5 flow through Lakes 1, 2 and 3)
3) Oyster Pond has two water control structures: 1) the Oyster Outlet drains to the Gulf of Mexico and 2) the "B-Pond" structure drains into Lake 4.
4) Dewatering programs should be initiated during the cooler periods to reduce the possibility of fish loss due to low oxygen and high water temperatures.

The lakes average 3-4 feet deep with maximum depths reaching 6-8 feet. Extensive stands of emergent and submergent aquatic vegetation are found throughout the shallow littoral zone of the lakes. Coontail (Ceratophyllum demersum), bladderwort (Utricularia spp.), widgeon grass (Ruppia maritima), musk-grass (Chara spp.) and cat-tails (Typha spp.) are the dominate vegetative types found in the lake.

Lake bottoms vary from oyster shell composition to sandy to mud to heavy organic sediments. It has been speculated by some that early timber cutting programs

resulted in years of lake bank erosion which contributed to the sediment loads found in some of the lakes. In addition, it is also thought the forest litter that accumulated over the years on the high ground was periodically flushed into the lakes during periods of unusually heavy rain, (tropical storms) which may add to the nutrient levels in the lakes and could reduce the water quality to a level as to jeopardize existing fish populations. However, to what degree this could have occurred is unknown. It is believed that the sawgrass zone around the lake perimeter had developed prior to the 1940's logging. It is also thought that the sawgrass would have acted as nature's filter and stopped most debris short of the lakes proper.

The current water quality analysis indicates a suitable habitat for rearing and propagating warm water sportfish (Appendix IV). The water is tanic in color with slightly acidic pH's (6.3 to 6.9). The total alkalinity (69 mg/l) and hardness (103-137 mg/l) measurements indicates habitat with moderate fish productivity. The aquatic habitat found in this geographical area is characteristically low in fertility which results in slower fish growth (Appendix V). However, habitat enhancement programs (liming/fertilization) are not suggested at this time due to the cost effectiveness and the marginal success obtained in habitats similar to St. Vincent's. The Refuge has reported oxygen deficient (less than 3 ppm) fish kills in the past. These kills were the result of natural phenomenon related to lake turnover, oxygen demand as the result of surface organic sediments entering the lakes during heavy periods of rain, salt water intrusion and excessive growths of aquatic vegetation reducing the available dissolved oxygen. The lakes all exhibit slight concentrations of sodium chloride ions caused by hurricanes and possibly underground seepage. The salinities however, are not of a concentration to restrict sport fish reproduction.

In order to improve the habitat and help alleviate some of the problems contributing towards the potential danger of low oxygen related fish kills, it is suggested that the following fishery management techniques be implemented when compatible with refuge programs and objectives: 1) periodic drawdowns to consolidate lake bottoms and control aquatic vegetation, 2) chemical control program of aquatic vegation, 3) cat-tail removal through dredging and/or controlled burning (where applicable) and 4) bank stabilization (Appendix VI & VII).

Fish Populations

The most notable species of sportfish found in St. Vincent's is the "hand painted", bluegill sunfish, (Lepomis macrochirus). This bluegill exhibits a unique color variation other than "normal" (Appendix VIII). The lateral surface of the fish is characteristically splotched with black markings of various size and number. Although the "handpaint" is reported in several other isolated localities of the Apalachicola River drainage, the St. Vincent Island population is the most abundant and is reported to have fish with a higher degree of coloration than other populations.

The Island has a history of producing trophy largemouth bass, (Micropterus salmoides) and also good catches of redear sunfish, (Lepomis microlophus). In addition, small numbers of warmouth bass, (Lepomis gulosus) and striped mullet, (Mugil cephalus) are found in most of the waters. Natural reproduction of sportfish is restricted due to less than optimum spawning conditions. However, the limited sportfish reproduction satisfies the carrying capacity of the habitat and provides a well ~~balanced~~ established sport fishery. Non-sport fish include spotted gar, (Lepisosteus oculatus), lake chubsucker, (Erimyzon succetta), bowfin (Amia calva), and threadfin shad (Dorosoma petenense). Current fishery surveys indicate high populations of spotted gar and lake chubsuckers in several of the lakes. Although these fish are in direct competition with the sport fish for food and habitat, they do not seem to detract from the game fish populations. However, non-sport fish eradication programs may be necessary in the future if sport fish populations show signs of a collapse.

The fishery programs on St. Vincent Island National Wildlife Refuge suffered a significant setback in September, 1985 when Hurricane Elena swept across the Refuge causing a major fish kill. Steps were taken to secure native broodstock from the island and propagate them at a National Fish Hatchery for future restocking. Efforts have been successful in completely restocking the island's lakes with "handpainted" bluegills during the fall of 1986. Largemouth bass fingerlings will be stocked during the spring of 1987. The fishery has been closed since the fish kill and should reopen in 1988.

The present fishing regulations (bag limits) adhere to State laws. However, due to the low productivity of the aquatic habitat and the slow growth of the game fish, a reduced bag limit on sunfish and a slot limit on largemouth bass may be appropriate at this time to permit the sport fishery to fully recover. Habitat of this type is expected to produce more than 40 pounds of harvestable-size (6 inch) bream and 10 pounds of harvestable (12 inch) largemouth bass per surface acre without adversely affecting population balance. Further fish population studies will be necessary in order to fully evaluate any future management decisions.

St. Vincent Island National Wildlife Refuge is managed as a primitive fishing area. Access to the island's freshwater lakes is by boat. In addition to freshwater angling, surf fishing is permitted on the south and east beaches from Indian Pass to St. Vincent Point. Approximately 1000 man days of fishing were recorded on St. Vincent's Island annually. Approximately 40% of the pressure is concentrated in Oyster Pond.

St. Vincent Island NWR and the Office of Fisheries Assistance will share varying degrees of responsibility for the following strategies. However, the Refuge manager will determine the degree of implementation the fishery management programs will be initiated on the Refuge.

Strategy I A - Surveys and Inventories

Task I - Compile a comprehensive fish species inventory. Utilize available literature and State, Federal, and private investigation to accomplish the task.

Task II - Update the fish species composition list as needed in conjunction with State, Federal and private fishery investigating.

Strategy II A - Habitat Management

Task I - Monitor and record the water quality in the lakes managed for sport fishing bimonthly (shorter sampling

periods may be necessary) during the spring and summer periods and monthly during the remaining periods. Maintain an awareness of any water quality changes that may alter the environment.

Task II - Increase the emphasis on aquatic vegetation control as appropriate (chemical or manual) to address the following:

1. The amount of aquatic vegetation present has reached a density as to jeopardize the health and well being of the warmwater organisms inhabiting the area (oxygen depletion, rapid pH fluctuations, etc.).

2. Fish population balance is altered when the predator species is unable to harvest the prey species due to the density of the vegetation.

3. Excessive emergent and submergent aquatic vegetation is limiting angler harvest.

Task III - Initiate a water drawdown program (winter) in impoundments where applicable and not conflicting with Refuge management objectives for the purpose of aquatic vegetation control and pond bottom consolidation.

Task IV - Document any natural or unnatural loss of aquatic habitat (drought, floods, etc.).

Task V - Keep abreast of any environmental decisions, legislation and public meetings that may directly or indirectly effect the freshwater and salt water habitat.

Strategy III A - Population Management

Task I - Conduct fish eradication programs in impoundments exhibiting unbalanced fish populations that cannot be

corrected with fish stockings, habitat manipulation and/or change in regulations.

Task II - The stocking of sport fish in refuge waters will be dependent upon:

A. Quality of aquatic habitat
B. Biologically sound decision
C. Stock availability
D. Refuge policy and programs

Task III - Follow the recommended sport fish stocking rates and periods unless lake management programs dictate otherwise.

A. Bluegill (70%) Redear sunfish (30%) fingerlings (1-2")
500/acre
fall stocking period
B. Largemouth bass
fingerlings (2")
50/acre
spring stocking - following bluegill and redear sunfish

Task IV - Warmwater sportfish will be provided by National Fish Hatcheries for restocking, maintaining and managing the freshwater fishery. Native broodstock obtained from St. Vincent Island NWR will be used in all spawning and restocking efforts conducted in the Refuge.

Task V - Restrict the use of live bait fish for angling purposes.

Task VI - Utilize sport creel checks throughout the fishing season to monitor the species diversity and quality of the fishery and to determine angler success. (Utilize a self directed creel check if refuge personnel are unavailable) (Appendix IX & XI)

Task VII - Annually evaluate reproduction, population density, growth and physical condition of the fishery and submit to the refuge manager a comprehensive report with findings and recommendations.

Task VIII - Continue to provide hatchery reared sport fish to sites for managing and biologically balancing the fish populations.

Task IX - Manage the harvest of sport fish in accordance with State laws and present refuge regulations. Additional regulations will be implemented, if necessary to maintain and provide a balanced sport fishery (length and creel limit, seasons, etc.). Further fishery investigations will be required prior to recommending any regulation changes (Appendix I).

Task X - Manage the sport fish populations in refuge water to produce on an annual basis 40 pounds of harvestable sunfish (6 inch) and 10 pounds of harvestable large-mouth bass per surface acre of water.

Strategy IV A - Protection

Task I - Utilize available law enforcement capabilities to protect the fresh and salt water habitat and its fauna according to State and Federal regulations/policies.

Strategy V A - Public Use

Task I - Install lake directional signs on primary refuge roadways and canals indicating areas being managed for sport fishing.

Task II - Maintain present boat access sites.

Task III - Limit boat motor size to electric trolling motors.

Task IV - Continue to manage the fishery utilizing the current primitive area fishing concept.

Strategy VI A - Research

Task I - Initiate an effort to determine fish species movement and habitat preference in Lakes 1 through 5.

Strategy VII A - Education and Involvement

Task I - Provide for public distribution a refuge pamphlet describing fishing areas, boat launches, and special fishing regulations.

Task II - Investigate using of volunteers for assistance in obtaining information on the aquatic habitat and its fishery resources. (Creel census, water quality, etc.)

Task III - Study the value of hosting special events (opening day of fishing, National Hunting and Fishing Day, etc.).

Task IV - Provide annual angler use days, creel data and other applicable information to the OFA, Panama City, Florida.

Task V - Incorporate in the Refuge Visitor Center an aquatic display depicting the multi-use principles incorporated on the refuge.

Subgoal B

Annually meet with Refuge staff to evaluate, update and change the fishery management plan as needed.

Summary

St. Vincent Island NWR — Fisheries Management Plan

Objectives	Task	Start/End	Organizations Lead/Support						
			RF	FAO	LE	HR	ES	RES	F&
The wildlife-oriented objectives of the St. Vincent Island National Wildlife Refuge include the utilization of available funding and manpower to develop a sport fishery that will maintain and enhance the quality of the future angling opportunities.	Strategy I A - Surveys &Inventories Task I - Compile a comprehensive fish species inventory. Utilize available literature and State, Federal and private investigations to accomplish the task.	1987/1988	L	S					S
Subgoal A Manage, maintain, and enhance and monitor the warmwater fish populations in designated areas as directed by Refuge policies related to associated programs, objectives and available funding and manpower.	Task II - Update the fish species composition list as needed in conjunction with State, Federal and private fishery investigations.	As Needed	L	S					S
	Strategy II A - Habitat Management Task I - Monitor and record the water quality in lakes managed for sport fishing bimonthly (shorter sampling periods may be necessary) during the spring and summer periods and monthly during the remaining periods. Maintain an awareness of any water quality changes that may alter the environment.	Annual	L	S		S			S
	Task II - Increase the emphasis on aquatic vegetation control as appropriate (chemical or manual) to address the following: 1) the amount of aquatic vegetation present has reached a density as to	As Needed	L	S		S			S

Objectives	Task	Start/End	Organizations RF	FAO	LE	HR	ES	RES	Lead/Suppor F&
	jeopardize the health and well being of the freshwater organisms inhabiting the area (oxygen depletion, rapid pH fluctuations, etc.). 2) Fish population balance is altered when the predator species is unable to harvest the prey species due to the density of the vegetative cover. 3) Excessive emergent and submergent aquatic vegetation is limiting angler harvest.								
	Task III - Initiate a water drawdown program (winter) in impoundments where applicable and not conflicting with Refuge management objectives for the purpose of aquatic vegetation control and pond bottom consolidation.	As Needed	L	S					
	Task IV - Document any natural or unnatural loss of aquatic habitat (drought, floods, etc.).	As Needed	L	S		S			S
	Task V - Keep abreast of any environmental decisions, legislation and public meetings that may directly or indirectly effect the mangrove estuary habitat.	Annual	L	S		S			S

Summary

St. Vincent Island NWR — Fisheries Management Plan

Objectives	Task	Start/End	Organizations Lead/Suppor RF	FAO	LE	HR	ES	RES	F&
	Strategy III A - Population Management Task I - Conduct fish eradication programs in impoundments exhibiting unbalanced fish populations that cannot be corrected with fish stockings, habitat manipulation and/or changes in regulations.	Annual	L	S					S
	Task II - The stocking of sport fish in refuge waters will be dependent upon: A. Quality of aquatic habitat B. Biologically sound decision C. Stock availability D. Refuge policy and programs	As Needed	L	S					
	Task III - Follow the recommended sport fish stocking rates and periods unless pond management programs dictates otherwise. (A & B)	As Needed	L	S					S
	Task IV - Warmwater sportfish will be provided by National Fish Hatcheries for restocking, maintaining and managing the freshwater fish populations. Native broodstock obtained from St. Vincent Island NWR will be used in all spawning and restocking efforts conducted in the Refuge.	As Needed	S	L					

Summary

St. Vincent Island NWR — Fisheries Management Plan

Objectives	Task	Start/End	Organizations Lead/Support RF	FAO	LE	HR	ES	RES	F&(
	Task V - Restrict the use of live bait fish for angling purposes.	Annual	L	S					S
	Task VI - Utilize spot creel checks throughout the fishing season to monitor the species diversity and quality of the fishery and to determine angler success. (Utilize a self directed creel check if refuge personnel are unavailable)	Annual	L	S					
	Task VII - Annually evaluate reproduction, population density, growth and physical condition of the fishery and submit to the refuge manager a comprehensive report with findings and recommendations.	Annual	S	L					S
	Task VIII - Continue to provide hatchery reared sport fish to sites for managing and biologically balancing the fish populations.	As Needed	S	L					

Summary

St. Vincent Island NWR — Fisheries Management Plan

Objectives	Task	Start/End	Organizations Lead/Support RF	FAO	LE	HR	ES	RES	F&C
	Task IX - Manage the harvest of sport fish in accordance with State regulations. Additional regulations will be implemented, if necessary to maintain and provide a balanced sport fishery (length and creel limits, seasons, etc.) Further fishery investigations will be required prior to recommending any regulation changes.	Annual	L	S	S				S
	Task X - Manage the sport fish populations in refuge water to produce on an annual basis 40 pounds of harvestable sunfish (6 inch) and 10 pounds of harvestable largemouth bass per surface acre of water.	Annual	L	S					S
	Strategy IV A - Protection Task I - Utilize available law enforcement capabilities, to protect freshwater habitat and its fauna according to State and Federal regulations/policies.	Annual	L		S				

Summary

St. Vincent Island NWR — Fisheries Management Plan

Objectives	Task	Start/End	Organizations Lead/Support RF	FAO	LE	HR	ES	RES	F&C
	Strategy V A - Public Use Task I - Install lake directional signs on primary refuge roadways and canals indicating areas being managed for sport fishing.	As Needed	L	S					
	Task II - Maintain present boat access sites.	Annual	L						
	Task III - Limit boat motor size to electric trolling motors.	Annual	L						
	Task IV - Continue to manage the fishery utilizing the current primitive area concept.	Annual	L	S					
	Strategy VI A - Research Task I - Initiate an effort to determine fish species movement and habitat preference in Lakes 1 through 5.	1987/1988	L	S		S	S	S	S
	Strategy VII A - Education and Involvement Task I - Provide for public distribution a refuge pamphlet describing fishing areas, boat launches, and special fishing regulations.	Annual	L	S					S

Summary

St. Vincent Island NWR	Fisheries Management Plan			Organizations			Lead/Support			
Objectives	Task	Start/End		RF	FAO	LE	HR	ES	RES	F&C
	Task II - Investigate using volunteers for assistance in obtaining information on the aquatic habitat and its fishery resources. (creel census, water quality, etc.)	As Needed		L	S					
	Task III - Study the value of hosting special events (opening day of fishing, National Hunting and Fishing Day, etc.).	Annual		L						
	Task IV - Provide annual angler use days, creel data and other applicable information to the OFA, Panama City, Florida.	Annual		L	S					
	Task V - Incorporate in the Refuge Visitor Center an aquatic display depicting the multiuse principles incorporated on the refuge.	Annual		L						
Subgoal B Annually meet with Refuge staff to evaluate, update and change the fishery management plan as needed.		Annual	L	S	S	S	S	S	S	

Organizational Unit - % of Total Effort

Organizational Units	% of Total Effort (Staff Years)				
	1986	1987	1988	1989	1990
St. Vincent Island NWR (RF)	75	75	77	79	80
Panama City, Fisheries Asst. (FAO)	11	11	10	10	10
Law Enforcement (LE)	1	1	1	1	1
Habitat Resources (HR)	4	4	4	3	3
Endangered Species (ES)	1	1	1	1	1
Research (RES)	7	7	6	5	4
State Fish & Game (F&G)	1	1	1	1	1

SPORT FISHING REGULATIONS

Sport fishing on the St. Vincent National Wildlife Refuge, Franklin County, Apalachicola, Florida, is permitted only on the areas designated by signs as open to fishing. These open areas, comprising 245 acres, are delineated on the map on the bottom of this page. Sport fishing shall be in accordance with all applicable State and Federal regulations subject to the following special conditions:

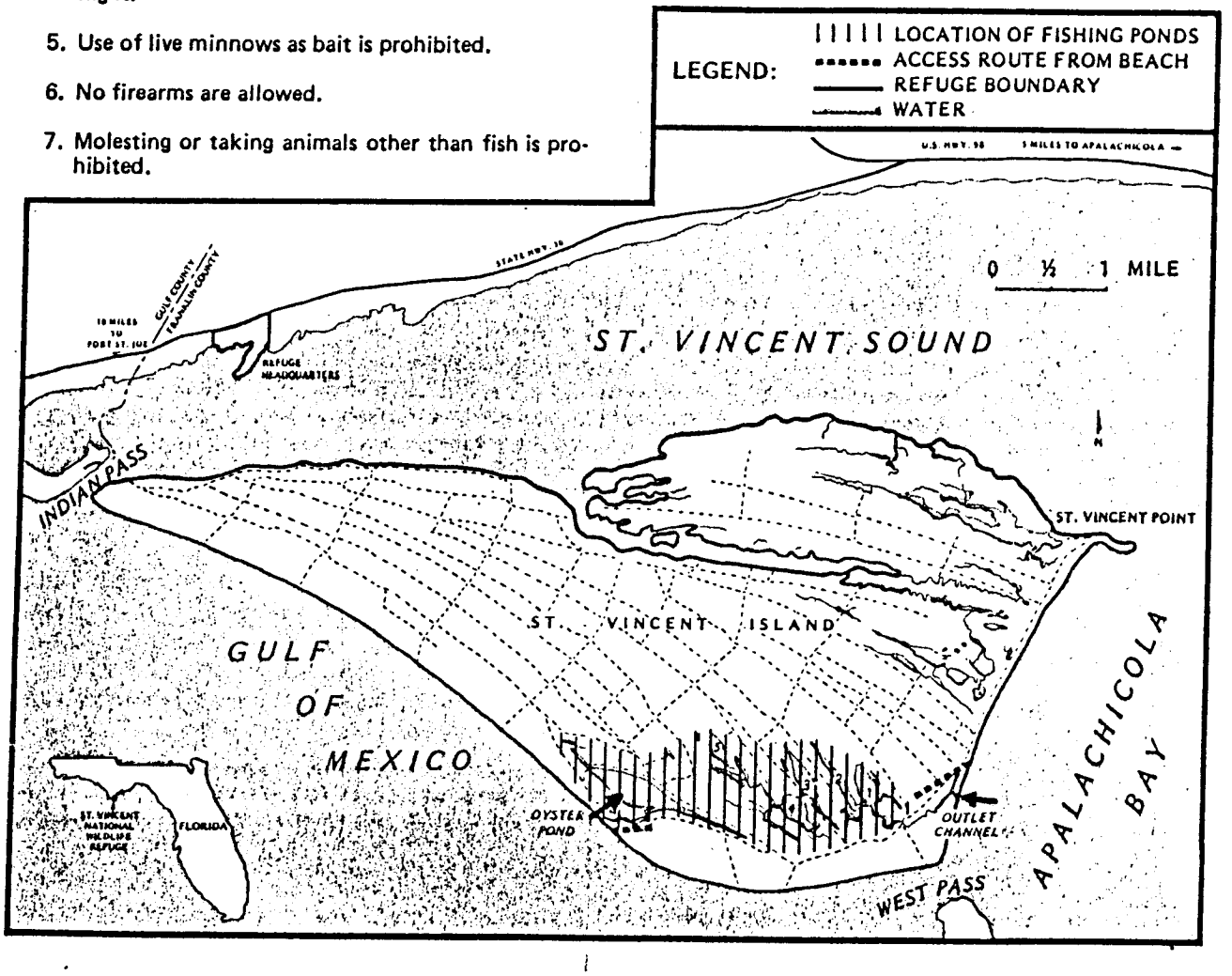
1. The sport fishing season extends from March 15 through October 15.
2. Fishermen are permitted on the refuge from half hour before sunrise to half hour after sunset.
3. Boats with electric motors permitted; all other motors prohibited.
4. Private boats may not be left on the refuge overnight.
5. Use of live minnows as bait is prohibited.
6. No firearms are allowed.
7. Molesting or taking animals other than fish is prohibited.

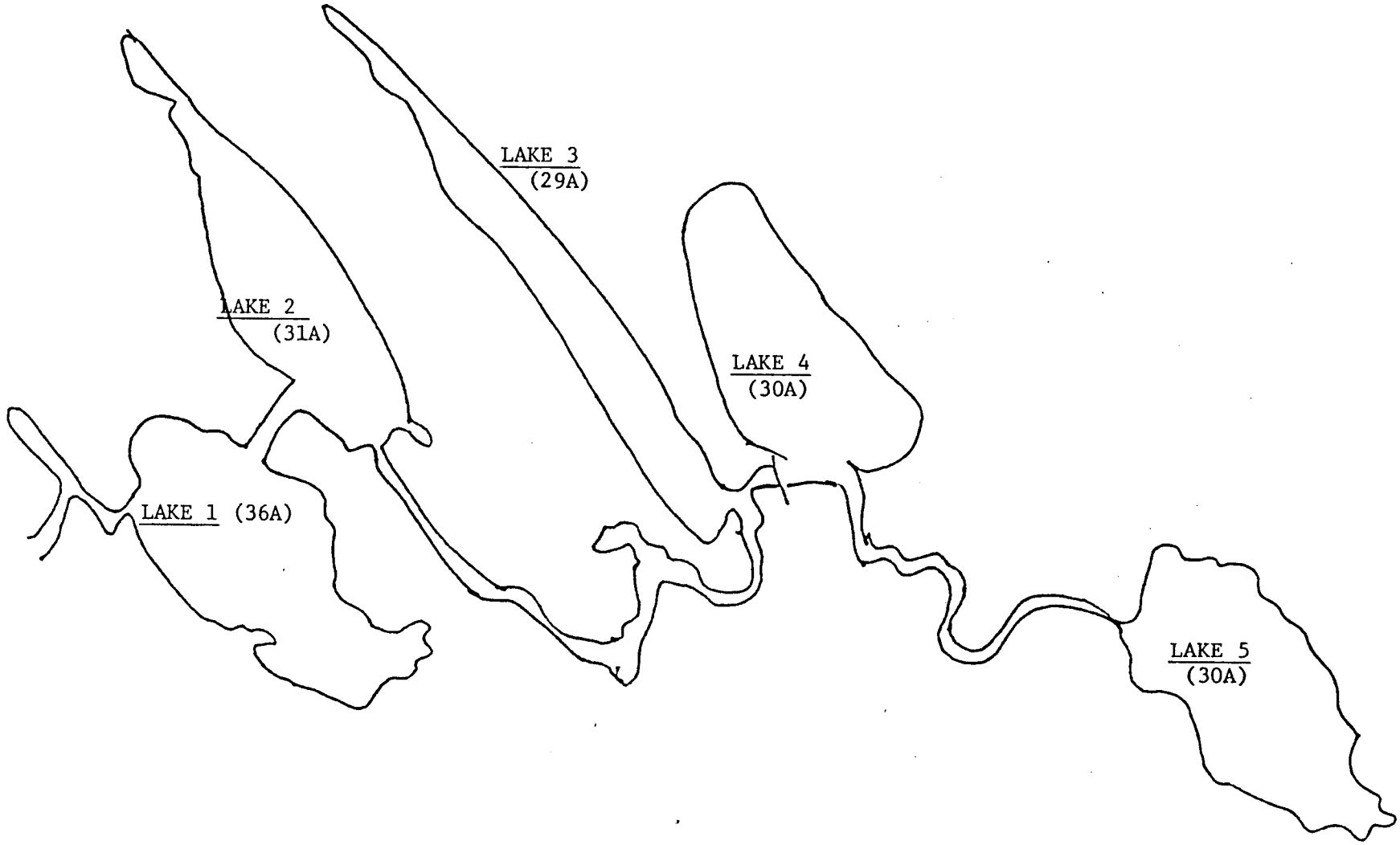
The provisions of these special regulations supplement the regulations which govern fishing on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 33.

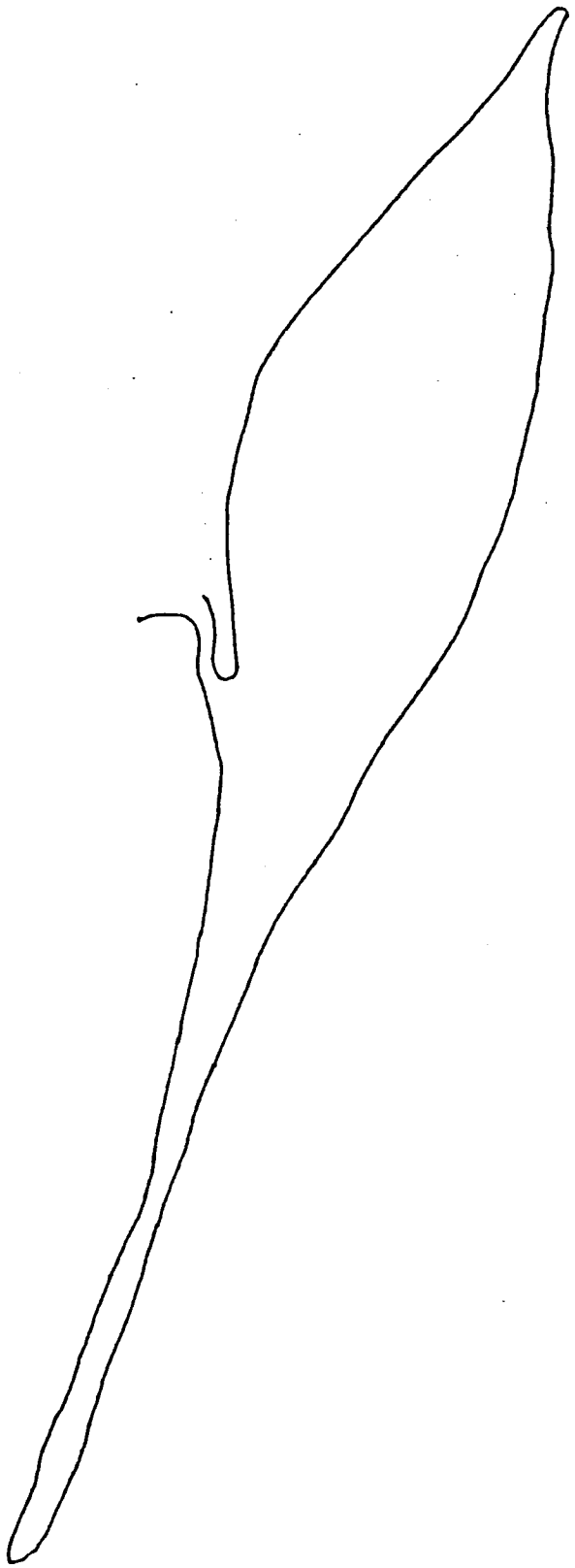
ADDITIONAL INFORMATION

St. Vincent National Wildlife Refuge is a 12,350 acre island located in Franklin County about 9 miles offshore from Apalachicola. This is primitive area fishing. The freshwater lakes 1 thru 5 may be reached from the island's east shoreline near West Pass. The Outlet Channel near West Pass may also be used for access to these lakes. Oyster Pond may be reached from the island's south shoreline at Oyster Pond Outlet. Most of the ponds are connected by small pole-boat channels. Travel light. *Be Safe.*

In addition to freshwater fishing in the interior ponds, surf fishing is permitted on the south and east beaches from Indian Pass to St. Vincent Point.




LAKE 3
(29A)
LAKE 2
(31A)
LAKE 4
(30A)
LAKE 1 (36A)
LAKE 5
(30A)



Oyster Pond
(116A)

St. Vincent National Wildlife Refuge - Water Quality Data

Lake	Date	Time (EST)	Temperature (F°) Surface	Temperature (F°) Bottom	Dissolved Oxygen (ppm) Surface	pH Surface	Salinity (ppt) Surface	Salinity (ppt) Bottom	Conductivity (umhos/cm) Surface	Conductivity (umhos/cm) Bottom
1	5/29/86	2:10 PM	90	86	4.0	8.0	8.0	6.0	16,000	13,000
1	7/18/86	10:45 AM	88	88	3.0	7.5	7.5	7.0	14,000	13,000
1	9/16/86	12:00 Noon	81.5	81.5	7.0	7.0	1.2	1.8	3,000	4,
2	5/29/86	1:55 PM	90	86	4.0	7.6	6.0	5.0	11,000	10,000
2	7/18/86	10:55 AM	88	88	3.0	7.5	7.0	7.0	13,000	13,000
2	9/16/86	12:10 PM	80.6	80.6	5.0	7.0	1.0	2.0	3,400	4,000
3	5/29/86	1:40 PM	90	86	7.0	7.7	1.0	2.0	2,000	4,000
3	7/18/86	11:00 AM	86	88	8.0	7.75	2.0	2.0	3,000	3,000
3	9/16/86	12:30 PM	82.4	82.4	6.0	6.9	.0	.2	680	1,450
4	5/29/86	1:10 PM	86	86	5.0	7.1	0	0	1,100	1,000
4	7/9/86	11:05 AM	90	86	5.0	7.2	1.0	1.0	1,200	1,200
4	8/5/86	10:25 AM	90	90	9.0	7.5	1.0	1.0	1.400	1,500
5	5/29/86	12:50 PM	83	90	13.0	8.0	0	0	500	600
5	7/9/86	11:00 AM	91	84	4.0	7.0	0	0	60	[illegible]
5	9/1/86	9:30 AM	77	77.5	---	6.8	.3	.4	1,150	1,
Oyster	5/29/86	11:50 AM	86	86	3.0	7.1	0	0	400	800
Oyster	6/19/86	2:20 AM	90	90	1.0	7.1	2.0	2.0	2,000	2,000
Oyster	8/6/86	10:15 AM	86	86	6.0	8.5	6.5	6.0	12,500	11,000

WATER QUALITY - Ranges For Warmwater Fish

Good quality water is essential to successful fish production in warmwater ponds (Calhoun, 1966; Carlander, 1977; Dillon, 1974). Water quality checks should be conducted on a bi-weekly basis during the summer months and monthly thereafter. However, additional water quality investigations may be necessary as the need arises. The water quality checks and parameters recommended are as follows:

Water Quality Checks	Chemical-Range-Values-for-Warmwater-Fish *
Dissolved oxygen (ppm)	5 - saturation
Carbon dioxide (ppm)	0 - 15
Total alkalinity (mg/l)	50 - 400
Total hardness (mg/l)	50 - 400
pH	6.5 - 9.0
Temperature	--------

* (Piper, 1982; Water Quality Criteria, 1968)

The water quality tests can be accomplished using an inexpensive field ecology kit.

* Water quality measurements should be made in the early morning hours when oxygen values are generally at their lowest point (Boyd, 1979)

Salinity - 3.85-4.25ppt (maximum for bass/bluegill reproduction - Tebo, 1964)

Aquatic Vegetation Control

Aquatic vegetation can be controlled using the following methods:

1. Proper Pond Construction

   Ponds should be constructed with properly sloping sides and a depth of 3 feet. A slope ratio of 2:1 is recommended for effective aquatic plant control.

2. Fertilization

   Fertilization during spring and summer encourages the growth of desirable plankton which restricts the sunlight penetration required for rooted aquatic growth (see fertilization)

3. Water Level Control

   Water level drawdowns can be used to successfully control rooted aquatic vegetation. Pond drawdowns should be conducted in the late fall and refilled in the spring.

4. Manual, Mechanical, Chemical and Biological Controls.

   A. Manual

   Manual weed control is impractical in most situations because of high labor costs. However, early removal of aquatic vegetation is an effective means of preventing serious weed infestations.

   B. Mechanical

   Aquatic weed cutters, raking and dredging can be used to control aquatic vegetation. However, these methods are utilized primarily along pond banks and are not very effective in open water areas.

C. Chemical

Herbicide use may be necessary to control heavy infestations of aquatic vegetation. The following steps should be considered when applying herbicides:

1. Identify the aquatic vegetation in order to match the proper herbicide to the particular weed problem (Traver, 1979).

2. Always read the directions and warnings on the product label.

3. Utilize only trained personnel to apply herbicides.

4. Use only herbicides that meet E.P.A. and F.W.S. requirements.

5. Apply herbicides during the early spring and summer. (Aquatic vegetation is more susceptible to treatment when plants are actually growing)

6. Treat only a portion of the aquatic vegetation in ponds with extensive weed coverage to prevent an oxygen depletion caused by the decaying vegetation.

Habitat and Fish Species Modifications or Control

1. A pond drawdown during the winter months is a useful management program designed to maintain balance by making the forage species more accessible to largemouth bass predation (Bennett, 1971). In addition, water level fluctuations can be used to discourage and encourage fish spawning activity.

2. Spot poisoning (Rotenone, Antimycin, Copper Sulfate crystals) of bluegill/redear sunfish nests during the spawning season will aid in providing some control in ponds suspected of going out of balance.

3. Restrict the use of live minnows for bait. Introduction of these species will cause problems in maintaining the proper "balance" in the pond (Noble, 1981).

A COLOR VARIATION OF THE BLUEGILL SUNFISH, *Lepomis macrochirus*

MELVIN T. HUISH
School of Forest Resources, University of Georgia, Athens

Bluegills (*Lepomis macrochirus*) having different markings than those found among "normal" populations exist in the Apalachicola River, Florida, and some of its tributaries. Although these fish have been known locally as the hand-painted bream, pied bream and/or spot for many years, it has not been reported in the literature. Specimens collected have melanistic areas which are variable in size and irregular in configuration. These black areas appear on either or both of the lateral surfaces of smaller and larger males (Fig. 1) and less conspicuously, on females. The number of spots varies from one to several on each fish. In some males there are further differences. These include a more extensive black spotting than found on females and a dark red coloration which extends from the head to the caudal peduncle dorsad of the lateral line. Also there exists on some adult males a yellowish color dorsad to the ventral fin.

Fish from the Flint River, Georgia, a major tributary of the Apalachicola, have the melanistic markings but are less colorful than those from portions of the Apalachicola River. Colorful specimens are reported by local guides and members of the Florida Game and Fresh Water Fish Commission to occur in such tributaries as Dead Lakes, Browns Lake, Porter Lake, Florida River, River Styx, Whites River, Chipola Cutoff, Bearman Creek and Lake Wimico. Their presence in two small lakes in the town of Wewahitchka, Florida, was also reported by local residents but confirmation was not obtained in 1963 collections. Conspicuously marked and normal specimens were collected from the Dead Lakes, White River and Lake Wimico. Collections in 1969 from the freshwater ponds on St. Vincent Island National Wildlife Refuge showed this variety to occur there also.

Five (2 males, 3 females) of the marked fish from the Dead Lakes and Lake Wimico were transported and stocked in a 0.3-acre pond, devoid of fish, at the University of Georgia School of Forest Resources, Whitehall Fishery Research Station, on April 16, 1965. These brood stock were not considered to be as heavily marked nor as colorful as some other specimens taken at the same time from Lake Wimico. On May 4, 1968, the pond was drained. Of a total of 1575 bluegill recovered, 12% (192) possessed one or more black spots on their sides and were more highly colored than the other fish in the pond. Thirty-five of the conspicuously-marked fish and two less well marked were released into another pond having no bluegill. Six males only were removed at the time of draining in May, 1969. No reproduction had

Bulletin of the Georgia Academy of Science 29:183-184, June, 1971.

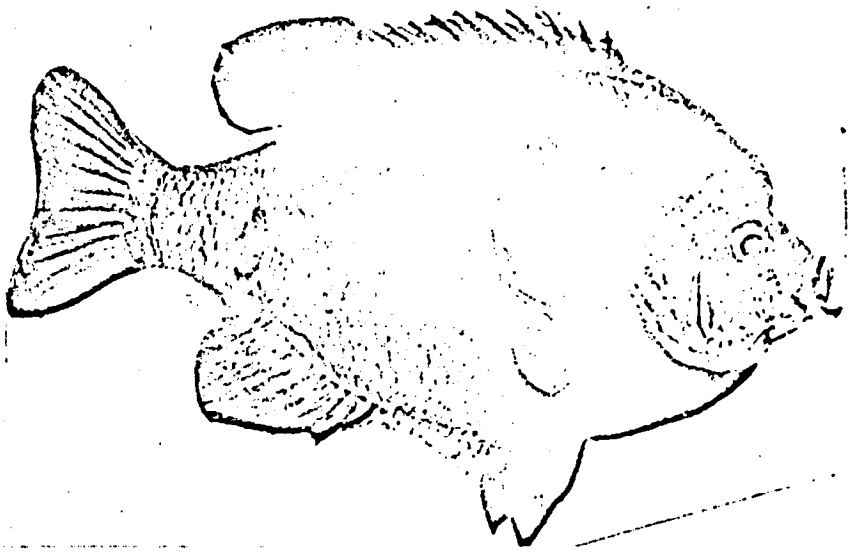


FIGURE 1
Adult male color variant of the bluegill.

occurred in the pond, and it is assumed only males were selected and stocked. In the spring of 1970 one large adult male having the distinctive marks was captured in a wiretrap from the North Fork of the Oconee River near the outlet of the Whitehall ponds. Since anecdotal evidence from sport fishermen also exists regarding a "different" sunfish in the Oconee River, it is believed this strain may now occur in this drainage area. Providing future collections do show their presence in the river, studies of the dispersal of this genetic factor in fish populations from such an environment will be possible.

Conclusions regarding the low frequency of occurrence of the marked fish are not drawn as a result of this brief study. However since predacious fish were not present in the pond, environmental selection against marked fish from that source did not take place. Further studies to determine the genetic nature of the marks are contemplated. The presence of the marks more conspicuously on the males (immature as well as mature) may offer the basis of sexual selection of these fish at young stages. Such selection would permit studies of monosexual production of this species.

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Sportfish Creel Census

A self imposed or roving creel census can provide valuable information concerning:

A. Quality (size of fish) of the sportfishery
B. Overall harvest (pounds and numbers of sport fish caught)
C. Angler success
D. Fishing pressure
E. Number of channel catfish removed from a pond (fish food adjustments and restocking data can be determined according to the number of fish remaining in the pond)

Pond Population Analysis From Angler Catch

Catch	Population Condition
a. Bluegill 6" and larger Bass - All sizes caught (av. 1 to 2 lbs.)	Desirable Balanced
b. Bluegill 3" to 5" Bass very few 2 lbs. and larger	Overcrowded Bluegill
c. Bluegill exceed 0.3 lbs. av. Bass less than 1 lb.	Bass Heavy
d. Small Crappie, Sunfish, Bullheads Carp, Suckers, Golden Shiner	Species competing with Bluegill

CREEL DATA SHEET

Installation _____

Water Fished _____

Date Fished _____

Hours Fished: Day _____ Night _____

Total Hours(to nearest .25 hr.) _____

I fished mainly for(check one)

bass _____ sunfish _____ catfish _____

other(list kind) _____

I would rate the overall quality of fishing today as (check one):

Good _____ Fair _____ Poor _____

Check here if no fish were caught _____

(Optional)

Name _____

Street _____

City & State _____ ZIP _____

Record No. (e.g. ~~IIII~~) of fish caught & RELEASED:

KIND	SIZE GROUPS		
BASS	8-11.9"	12-14.9"	15" & over
SUNFISH	under 6"	6-7.9"	8" & over
CATFISH	11-14.9"	15-17.9"	18" & over
OTHERS	under 8"	8-9.9"	10" & over

Record No. (e.g. ~~IIII~~) of fish caught & KEPT:

KIND	SIZE GROUPS		
BASS	8-11.9"	12-14.9"	15" & over
SUNFISH	under 6"	6-7.9"	8" & over
CATFISH	11-14.9"	15-17.9"	18" & over
OTHERS	under 8"	8-9.9"	10" & over

FISHING LOG MONTH: ______ YEAR: ______ AREA OR LAKE: ______

NAME	LICENSE #	DATE	TIME IN	TIME OUT	LENGTH (INCHES)/ SPECIES	# CAUGHT/# KEPT 4	5	6	7	8	10	12	14	16	18	≥ 20
					CATFISH											
					BASS											
					BREAM											
					OTHER											
					CATFISH											
					BASS											
					BREAM											
					OTHER											
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					CATFISH											
					BASS											
					BREAM											
					OTHER											

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